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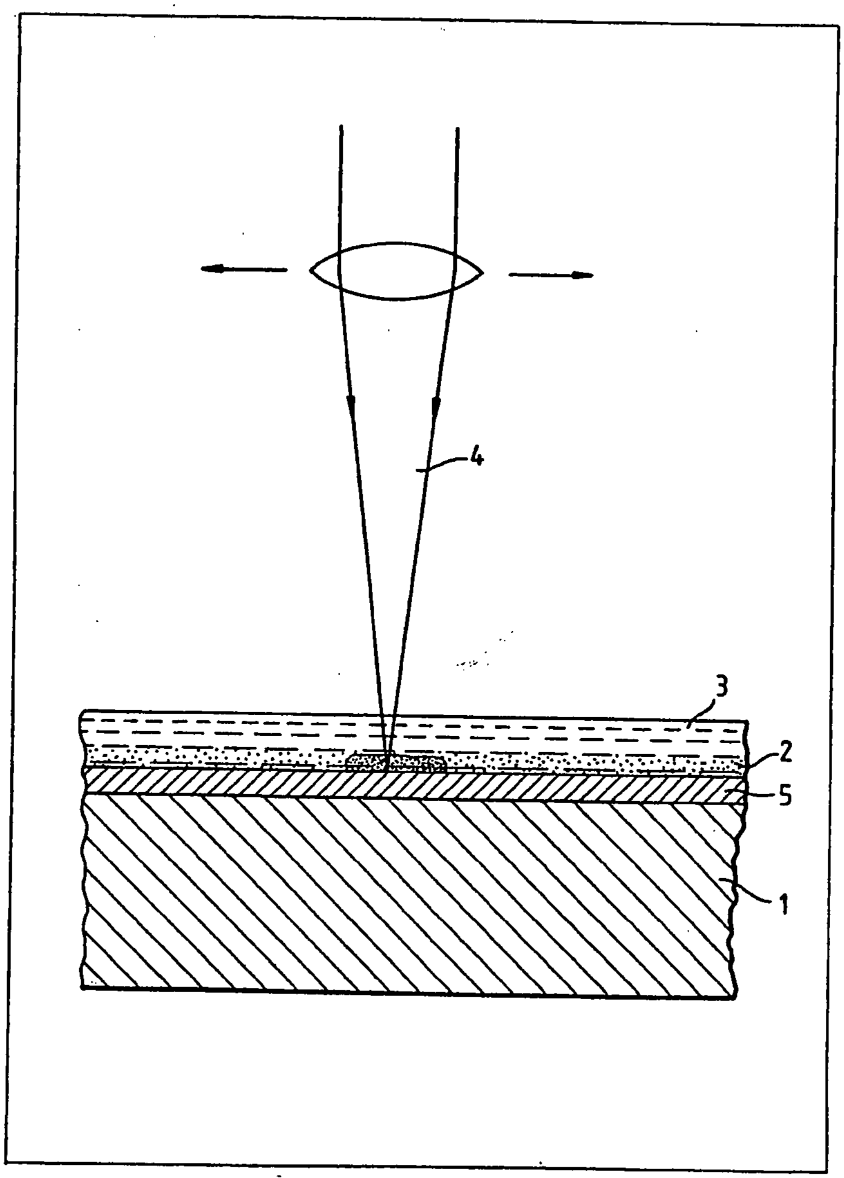
(54) **Fabricating solder tracks**

(57) A method of forming metal alloy tracks on a planar substrate, e.g. a copper clad laminate 1. The substrate surface is coated with solder particles 2 in a fluid carrier 3. The surface is then traversed with a focussed beam 4 of radiant energy of a wavelength such that there is a low absorption of energy in the fluid carrier and a high absorption of energy in the particles which are thereby fused to the copper cladding 5. The substrate is then washed to remove surplus particles and the exposed copper is etched using the fused solder tracks as a mask.



The drawing originally filed was informal and the print here reproduced is taken from a later filed formal copy.

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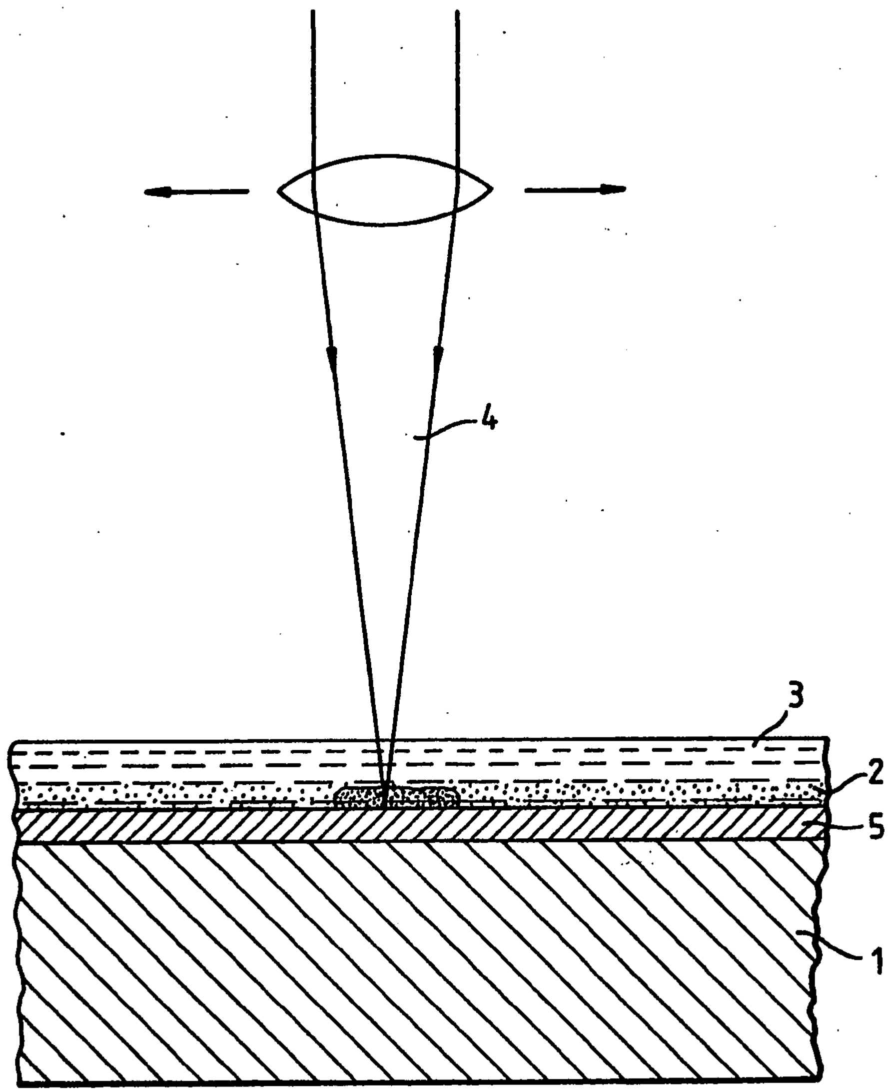

SPECIFICATION

Fabricating solder tracks

This invention relates to the melting of metal alloys to form circuit tracks for electrical or electronic equipment.

It is known to form solder tracks on copper clad laminates in the printed circuit industry. Typically a solder pattern is formed by screen printing an ink containing solder particles on the copper clad laminate and then firing the laminate at a temperature sufficient to fuse the solder particles to the copper. Or the screened pattern may be subjected to a "re-flow soldering" operation, in which a source of radiant heat is passed across the face of the laminate to melt the solder. The solder printed laminate may then be etched to remove copper from those areas not covered by solder or by photoresist.

According to the present invention there is provided a method of forming a metal alloy track on a substrate comprising the steps of coating a surface of the substrate with a layer of metal alloy particles in a carrier, exposing selected portions of the coated surface to radiant energy such that the metal alloy particles are melted and bonded to the substrate in preference to the carrier to form the track, and subsequently removing from the substrate particles not melted and bonded to the substrate.

Embodiments of the invention will now be described with reference to the accompanying drawing.

A copper clad laminate 1, such as is used in the printed circuit art, is covered on one face with a layer 2 of solder powder in a fluid carrier 3. The solder, which is typically a tin-lead alloy containing 60—63% by weight of tin, is in the form of micron-sized particles and the carrier fluid may be an organic material, e.g. an alkene, alcohol, ether, ester or carboxylic acid. The covered laminate is immobilised long enough to allow the solder particles to settle to form an even coating on the laminate surface. Then, using a conventional x-y mechanism with suitable optics a focussed beam 4 of narrow-band radiant energy, e.g. infrared radiation with a wavelength of 4—5 μm, is traversed across the covered surface in the desired pattern. The fluid carrier should have a low absorption window for the radiant energy so that most of the energy is absorbed by the solder particles which are melted and fused to the underlying copper 5. There will be localised heating of the fluid in the immediate vicinity of the solder particles but there should be sufficient fluid to prevent boiling or vaporisation. The fluid will also act as a flux for the solder and prevent undue oxidation during heating. The surplus solder powder is then washed off the laminate, after which exposed copper can be removed by etching, the fused solder pattern acting as an etch resist. Defocussed beams can also be used to reflow solder on boards covered with an organic fluid.

As an alternative to infrared heating the output of a laser can be utilized. For example a YAC laser beam with a wavelength of 1.06 m can be used since the carrier fluids listed above also have a low absorption window of between 0.9 and 1.1 m, above the —OH absorption peak.

This invention can also be used to apply solder tracks on other materials, e.g. ceramics. In such cases the solder powders should be based on metals which provide a suitable wetting of the ceramic, e.g. bismuth or indium. Such ceramic based tracks find application in thick-film or hybrid circuits.

CLAIMS

1. A method of forming a metal alloy track on a substrate comprising the steps of coating a surface of the substrate with a layer of metal alloy particles in a carrier, exposing selected portions of the coated surface to radiant energy such that the metal alloy particles are melted and bonded to the substrate in preference to the carrier to form the track and subsequently removing from the substrate particles not melted and bonded to the substrate.

2. The method according to claim 1 wherein the exposure is effected by traversing the coated surface with a focussed beam of radiant energy.

3. The method according to claim 1 wherein the substrate is a copper clad laminate and the metal alloy is a tin-lead solder.

4. The method accoridng to claim 2 including the further step of etching the exposed copper from the areas of the substrate not covered by the melted solder.

5. The method according to claim 1 wherein the substrate is a ceramic material and the metal alloy is a solder based on a metal having ceramic-wetting properties.

6. The method according to any preceding claim wherein the radiant energy wavelength is in the range 4 to 5 m.

7. The method according to any one of claims 1—4 wherein the radiant energy wavelength is in the range 0.9 to 1.1 m.

8. The method according to claim 6 wherein the radiant energy wavelength is 1.06 m.

9. A method of forming metal alloy tracks on a planar substrate substantially as hereinbefore described.

10. An electrical circuit fabricated by the method according to any preceding claim.

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